

CLAIMS

This listing of claims shall replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Previously Presented) A connecting assembly for interconnecting spinal rods secured to spinal vertebrae, the connecting assembly comprising:
 - a pair of spinal rod connecting devices;
 - a contact surface of each of the connecting devices for seating on one of the spinal rods;
 - a locking member for being shifted between a clamped position with the locking member clamping the spinal rod against the contact surface and an unclamped position with the spinal rod released; and
 - a non-threaded rotatable actuator operable to shift the locking member between the clamped and unclamped positions, the non-threaded actuator being configured to be rotatable by a predetermined rotary amount less than one full turn thereof to a predetermined locked position thereof corresponding to the clamped position of the locking member on the spinal rod.
2. (Previously Presented) The connecting assembly of claim 1 wherein the contact surface for seating on the spinal rod is an arcuate surface.

Application No. 10/692,460

Response dated April 24, 2009

Response to Office Action dated December 24, 2008

3. (Previously Presented) The connecting assembly of claim 1 wherein the locking member has an arcuate surface such that the arcuate surface is secured against the spinal rod when in the clamped position.

4. (Currently Amended) A connecting assembly for interconnecting spinal rods secured to spinal vertebrae, the connecting assembly comprising:

a pair of spinal rod connecting devices;

a contact surface of each of the connecting devices for seating on one of the spinal rods;

a locking member for being shifted between a clamped position with the locking member clamping the spinal rod against the contact surface and an unclamped position with the spinal rod released; and

a rotatable actuator at least partially disposed in each connecting device operable to shift the locking member between the clamped and unclamped positions, the actuator rotatable by a predetermined rotary amount to a locked position thereof corresponding to the clamped position of the locking member on the spinal rod wherein at least one spinal rod connecting device further includes a spring retention member for biasing the locking member in the unclamped position.

5. (Previously Presented) The connecting assembly of claim 4 wherein the spring retention member is compressed when the locking member is moved to the clamped position.

6. (Previously Presented) The connecting assembly of claim 5 wherein the spring retention member is a split ring located around the rotatable actuator member, and the ring is compressed when the locking member is moved to the clamped position.

7. (Previously Presented) The connecting assembly of claim 1 wherein the rotatable actuator is located in a bore in the spinal rod connecting device, and the bore includes a pair of arcuate camming surfaces for camming against the rotatable actuator.

8. (Currently Amended) A connecting assembly for interconnecting spinal rods secured to spinal vertebrae, the connecting assembly comprising:

- a pair of spinal rod connecting devices;

- a contact surface of each of the connecting devices for seating on one of the spinal rods;

- a locking member for being shifted between a clamped position with the locking member clamping the spinal rod against the contact surface and an unclamped position with the spinal rod released; and

- a rotatable actuator operable to shift the locking member between the clamped and unclamped positions, the actuator rotatable by a predetermined rotary amount to a locked position thereof corresponding to the clamped position of the locking member on the spinal rod wherein the rotatable actuator member has a recess, and the locking member is secured in the recess of the rotatable actuator member such that the rotatable actuator member and locking member may rotate relative to each other.

9. (Previously Presented) The connecting assembly of claim 8 wherein the recess is an annular channel.

10. (Previously Presented) A connecting assembly for interconnecting spinal rods secured to spinal vertebrae, the connecting assembly comprising:

- a pair of spinal rod connecting devices for being connected to a respective pair of spinal rods;

- a cross rod having opposite ends and a central longitudinal rod axis extending therebetween and being connected to a first one of the pair of spinal rod connecting devices at a first one of the opposite rod ends;

- a rod receiving member having a central longitudinal receiver axis and being connected to a second one of the pair of spinal rod connecting devices, the rod receiving member including an internal bore oriented along the receiver axis and being configured for adjustably receiving a second one of the opposite rod ends so that the rod may be pivoted with respect to the receiver axis to provide the rod with variable angles relative thereto and so that the cross rod may be shifted axially along the rod axis to variable depths within the bore of the rod receiving member;

- a clamp device for clamping against the cross rod received in the rod receiving member; and

- a sleeve that extends about the rod receiving member and is shifted therealong for clamping the clamp device against the cross rod to fix the cross rod at an adjusted angle and an adjusted depth within the receiving member.

11. (Previously Presented) The connecting assembly of claim 10 wherein the internal bore of the rod receiving member receives the cross rod such that the cross rod may be adjustably rotated in the rod receiving member around a longitudinal axis of the cross rod.

12. (Previously Presented) The connecting assembly of claim 11 wherein the clamp device may pivot to permit pivoting of the cross rod.

13. (Previously Presented) The connecting assembly of claim 12 wherein the clamp device includes an inner surface for mating with the external surface of the cross rod.

14. (Previously Presented) The connecting assembly of claim 13 wherein with at least a portion of the inner surface of the clamp device is arcuate for mating with the external surface of the cross rod, and the cross rod may be rotatably adjusted relative to the clamp device.

15. (Previously Presented) The connecting assembly of claim 10 wherein the cross rod includes a protrusion for retaining the crossrod within the rod receiving member.

16. (Previously Presented) A connecting assembly for interconnecting spinal rods secured to spinal vertebrae, the connecting assembly comprising:

Application No. 10/692,460

Response dated April 24, 2009

Response to Office Action dated December 24, 2008

a pair of spinal rod connecting devices for being connected to a respective pair of spinal rods;

a cross rod having opposite ends and a central longitudinal rod axis extending therebetween and being connected to a first one of the pair of spinal rod connecting devices at a first one of the opposite rod ends;

a rod receiving member having a central longitudinal receiver axis and being connected to a second one of the pair of spinal rod connecting devices, the rod receiving member including an internal bore oriented along the receiver axis and being configured for adjustably receiving a second one of the opposite rod ends so that the rod may be pivoted with respect to the receiver axis to provide the rod with variable angles relative thereto and so that the cross rod may be shifted axially along the rod axis to variable depths within the bore of the rod receiving member;

a clamp device for clamping against the cross rod received in the rod receiving member; and

a sleeve for clamping the clamp device against the cross rod to fix the cross rod at an adjusted angle and an adjusted depth within the receiving member wherein the sleeve includes an internal structure that imparts a compression force on the clamp device for securing the cross rod.

17. (Previously Presented) The connecting assembly of claim 16 wherein the rod receiving member includes a terminal surface for limiting the position of the clamp device.

18. (Previously Presented) The connecting assembly of claim 17 wherein the clamp device is compressed between the terminal surface of the rod receiving member and the internal structure of the sleeve to secure the cross rod.

19. (Previously Presented) The connecting assembly of claim 17 wherein the internal structure of the sleeve contacts the clamp device directly.

20. (Previously Presented) The connecting assembly of claim 17 wherein the internal structure of the sleeve that contacts the clamp device includes a shoulder portion.

21-23. (Canceled)

24. (Previously Presented) A connecting assembly for interconnecting a pair of spinal rods secured to spinal vertebrae, the connecting assembly comprising:

a pair of spinal rod connecting devices each having an arcuate surface and a locking member for clamping the connecting assembly to the pair of spinal rods;

a cross rod being connected to one of the connecting devices, the cross rod having a solid construction without a slot formed therein;

a rod receiving member being connected to the other connecting device, the rod receiving member including an internal generally annular bore configured for receiving and guiding the solid cross rod for depth adjustment therein;

a clamp device configured for extending about and clamping against the solid cross rod when received in the rod receiving member;

a sleeve that is operable for clamping the clamp device against the solid cross rod; and

side openings in the receiving member that open to the bore to allow the solid cross rod to be pivoted in and out of the bore through the side openings, wherein the cross rod has lateral surfaces which may be pivoted relative to the rod receiving member into and out of the bore and through the rod receiving member side openings.

25. (Previously Presented) The connecting assembly of claim 24 wherein the cross rod has a central longitudinal axis, and the rod receiving member has a central longitudinal axis.

26. (Previously Presented) The connecting assembly of claim 24 wherein the cross rod may be pivoted to a position such that the cross rod is protruding from one of the side openings.

27. (Previously Presented) A connecting assembly for interconnecting a pair of spinal rods secured to spinal vertebrae, the connecting assembly comprising:

a pair of spinal rod connecting devices each having an arcuate surface and a locking member for clamping the connecting assembly to the pair of spinal rods;

a cross rod being connected to one of the connecting devices;

a rod receiving member being connected to the other connecting device, the rod receiving member including an internal bore for receiving the cross rod;

a clamp device for clamping against the cross rod when received in the rod receiving member;

a sleeve for clamping the clamp device against the cross rod;

side openings in the receiving member that open to the bore to allow the cross rod to be pivoted in and out of the bore through the side openings, wherein the cross rod has lateral surfaces which may be pivoted relative to the rod receiving member into and out of the side openings;

wherein the cross rod has a central longitudinal axis, and the rod receiving member has a central longitudinal axis;

wherein the lateral surfaces of the cross rod are beveled towards the central longitudinal axis of the cross rod at an end of the cross rod.

28. (Previously Presented) The connecting assembly of claim 1 wherein the actuator member is rotatable by about 80° to about 110° to the locked position thereof corresponding to the clamped position of the locking member.

29. (Previously Presented) The connecting assembly of claim 1 wherein the actuator member has an axis of rotation and the actuator member shifts axially along the axis of rotation during rotation of the actuator member about the axis of rotation to the locked position.

30. (Previously Presented) A connecting assembly for interconnecting spinal rods secured to spinal vertebrae, the connecting assembly comprising:

Application No. 10/692,460

Response dated April 24, 2009

Response to Office Action dated December 24, 2008

a pair of spinal rod connecting devices for being connected to a respective pair of spinal rods;

a cross rod having opposite ends and a central longitudinal rod axis extending therebetween and being connected to a first one of the pair of spinal rod connecting devices at a first one of the opposite rod ends;

a rod receiving member having a central longitudinal receiver axis and being connected to a second one of the pair of spinal rod connecting devices, the rod receiving member including an internal bore oriented along the receiver axis and being configured for adjustably receiving a second one of the opposite rod ends so that the rod may be pivoted with respect to the receiver axis to provide the rod with variable angles relative thereto and so that the cross rod may be shifted axially along the rod axis to variable depths within the bore of the rod receiving member;

a clamp device for clamping against the cross rod received in the rod receiving member; and

a sleeve for clamping the clamp device against the cross rod to fix the cross rod at an adjusted angle and an adjusted depth within the receiving member wherein the sleeve is rotated to clamp the clamp device against the cross rod.